17733

NATIONAL LIBRARY
OTTAWA

CANADA

BIBLIOTHÈQUE NATIONALE
OTTAWA

NAME OF AUTHOR.....Michael Wilkinson.....

TITLE OF THESIS.....Some Personality Correlates of Ideational Persistence.....

.....

UNIVERSITY.....University of Alberta.....

DEGREE FOR WHICH THESIS WAS PRESENTED.....M.Ed.....

YEAR THIS DEGREE GRANTED.....1973.....

Permission is hereby granted to THE NATIONAL LIBRARY OF CANADA to microfilm this thesis and to lend or sell copies of the film.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

(Signed).....M. Wilkinson.....

PERMANENT ADDRESS:

P.O. Box 3594, Stn. D'
Edmonton
Alberta

DATED.....September 28.....19 73

NL-91 (10-68)

THE UNIVERSITY OF ALBERTA

SOME PERSONALITY CORRELATES OF IDEATIONAL PERSISTENCE

BY

© MICHAEL WILKINSON

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF EDUCATION

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

EDMONTON, ALBERTA

FALL, 1973

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled "Some Personality Correlates of Ideational Persistence" submitted by Michael Wilkinson in partial fulfilment of the requirements for the degree of Master of Education.

.....E. E. Dion.....
Supervisor

.....D. R. Saunders.....

.....K. A. Neufeld.....

Date.....September 26.....,1973

ABSTRACT

An ideational persistence task, comprising the Nintendo Challenge Dice, was administered to 40 subjects in conjunction with tests of selected personality variables. Specifically examined were introversion, neuroticism, reflectivity, authoritarianism and attitude toward school, in terms of their relationship to persistence.

Twenty males and 20 females, randomly selected from the 78 grade nine students attending the junior high school of a small town in northern Alberta, served as subjects for this study. The personality measures, presented as an opinion survey to all the grade nine students, included the IPAT Contact Personality Factor scale, the IPAT Neuroticism Scale Questionnaire, the Gordon Personal Inventory (C Scale), the F-Scale and the Attitude Toward Any Institution Scale (Remmers Short Form). These measures were used as indices of extraversion - introversion, neuroticism, impulsivity - reflectivity, authoritarianism and attitude toward school, respectively. Actual time spent on the Nintendo Challenge Dice, which was presented to the subjects as a test of problem solving skill under individual conditions of testing, was taken as a measure of ideational persistence. The highest 50% and the lowest 50% of the scorers on the ideational persistence test were identified as high and

low persisters, respectively, and the significance of the difference between the means of the two groups for each of the personality measures was calculated.

The results of this study revealed a positive relationship between ideational persistence and lack of neuroticism ($p < .02$). However, no significant relationships were found between ideational persistence, on the one hand, and introversion, reflectivity, authoritarianism and a positive attitude toward school, on the other hand. These findings were interpreted, and implications for further research and the classroom were explored.

ACKNOWLEDGMENTS

The author wishes to express his appreciation to Dr. E. E. Fox for his help, guidance and encouragement.

Gratitude, for their assistance, is also extended to Dr. D. D. Sawatzky, Dr. K. A. Neufeld, fellow graduate students and all those who participated in the research.

TABLE OF CONTENTS

CHAPTER		PAGE
I	INTRODUCTION	1
	Persistence and Achievement	1
	Nature of Persistence	2
	Persistence Measures	5
	The Problem	5
II	REVIEW OF THE RELATED LITERATURE	7
	IDEATIONAL PERSISTENCE AND SELECTED PERSONALITY VARIABLES	7
	Extraversion - Introversion and Ideational Persistence	7
	Neuroticism and Ideational Persistence	9
	Impulsivity - Reflectivity and Ideational Persistence	12
	Authoritarianism and Ideational Persistence	14
	Attitude Toward School and Ideational Persistence	15
	HYPOTHESES	16
III	DESIGN AND PROCEDURE	18
	Sample	18
	Procedure	18
	INSTRUMENTS	20
	The Ideational Persistence Test	20
	IPAT Contact Personality Factor	22

CHAPTER PAGE

IPAT Neuroticism Scale Questionnaire . . . 23

Gordon Personal Inventory, C Scale 24

The F-Scale 25

The Attitude Toward Any Institution Scale 25

IV FINDINGS AND CONCLUSIONS 27

HYPOTHESIS 1 27

Findings 27

HYPOTHESIS 2 29

Findings 29

HYPOTHESIS 3 29

Findings 29

HYPOTHESIS 4 30

Findings 30

HYPOTHESIS 5 30

Findings 30

Conclusions 31

V DISCUSSION AND IMPLICATIONS 33

DISCUSSION 33

Ideational Persistence and Neuroticism . . 33

Ideational Persistence and Introversion . 34

Ideational Persistence and Reflectivity . 35

Ideational Persistence and Authoritarianism 37

Ideational Persistence and Attitude Toward School 38

CHAPTER PAGE

IMPLICATIONS 39

BIBLIOGRAPHY 41

LIST OF TABLES

Table	Description	Page
I	Summary of Differences Between High and Low Persisters on Five Personality Indices	28

LIST OF FIGURES

Figure		Page
I	Nintendo Challenge Dice	20
II	Adaptation of Parkers' Soma	21

LIST OF PHOTOGRAPHIC PLATES

Plate	Description	Page
I	The Completed Nintendo Challenge Dice and the Assembled Adaptation of Parkers' Soma	19

CHAPTER I

INTRODUCTION

Persistence and Achievement

After a mathematical concept has been presented and practice exercises have been assigned, Marvin works for a comparatively short time before turning to some diversion. When questioned in this regard, Marvin says that he doesn't want to do any more, that it is too hard. In social studies, Marvin again responds in a similar way, and it is difficult to get him to complete his assignments. Even in art, which is his favorite subject, he frequently leaves projects unfinished. On the other hand, Peter, who has comparable ability, rarely fails to complete an undertaking and is more successful, in terms of academic achievement, than Marvin. Few classroom teachers would fail to recognize these brief descriptions as an illustration of individual differences in persistence.

From interviews with colleagues and through past experience, it is easy to agree with Means, Means, Osborne and Elsom (1973) when they say that the classroom teacher is often concerned with the persisting behavior of his students. Estimates of persistence serve as an important, formal criterion in transfering pupils from the primary to the secondary school in England (MacArthur, 1955). A positive relationship is commonly assumed to exist between persistence and achievement,

and research lends support to this widely held belief (MacArthur, 1955). Studies of persistence indicate that persistence measures are usually related to school success, despite the fact that persistence measures generally have very low positive relationships with intelligence, and that ability at specific tasks is usually only slightly and positively related to persistence at these tasks (MacArthur, 1955). Diciaula (1970), for example, found that persistence was positively correlated with high school grade point average ($p < .05$), but that persistence was not related to Scholastic Aptitude Test Scores. Ollendick (1971) also reported that Otis-Lennon I.Q. and academic grades were positively, but not significantly, related.

Nature of Persistence

Persistence is generally studied from one of three main theoretical perspectives (Feather, 1962). Firstly, a number of researchers conceive of persistence as a trait underlying behavior. Studies in this class include the early nonfactorial trait investigations of persistence by Hartshorne, May and Maller (1929) and Ryans (1938), which investigated correlations between persistence scores and other variables, such as age, intelligence and academic achievement, or correlations between persistence scores for a large number of different tasks. More recent studies of this type are exemplified by the factorial

investigation of persistence by MacArthur (1955) and by the studies of Costello and Eysenck (1961) and Brachman and Costello (1963), which investigated the relationships between selected personality variables and different types of persistence identified through factorial analysis.

Secondly, persistence may be conceived as resistance to extinction (Feather, 1962). Characteristically, the subject performs a task without reinforcement, after being treated with a particular type of reinforcement schedule during an acquisition series. Although such studies are not commonly classified as persistence investigations, continuing an activity in the absence of reinforcement is similar to the persistence situation where the subject works at a task without success. Comprehensive coverage of the research on partial reinforcement is provided in the reviews by Jenkins and Stanley (1950) and Lewis (1960). The general finding in these studies is that resistance to extinction after partial reinforcement is greater than after continuous reinforcement, when behavior strength is measured in terms of single responses.

Thirdly, a relatively large number of investigators conceive of persistence as a motivational phenomenon. Of particular relevance in this context are Lewin's field theory and theories of achievement motivation. According to Lewin (1946), "What is usually called persistence is an expression of how quickly goals change when the individual encounters obstacles" (p. 824). Lewin's field

theory appears to approximate the approach in which persistence is considered mainly in terms of situational parameters, leaving personality variables relatively unspecified. The other general approach, of which Atkinson's (1957, 1960) theory of achievement motivation is an example, is more thoroughly interactive. Stable personality dispositions, or motives, are conceived in interaction with expectations and incentive values, which are situationally defined.

Trait studies and studies in which persistence is conceived as resistance to extinction do not tend to consider both personality and situational variables in interaction. Motivational studies commonly take account of both types of variables in interaction, but limit the personality variables to achievement related motives. Although relatively few studies have investigated the relationship between persistence and personality, a small number of fairly recent investigations have attempted to consider the interactional effects of certain personality variables and situational factors on persistence. Grotberg (1958) investigated experimentally the contemporary interaction of group atmosphere and temperament traits on persistence. Brachman and Costello (1963) studied the effects of neuroticism and extraversion, under conditions of group and individual testing, on physical and mental persistence. Petersen (1968) examined the relationship between four personality-types and short and long-term persistence, on

an ambiguous task, both before and after failure. DiCola (1971) investigated the effect of verbal reinforcement on the relationship between physical persistence and self esteem.

Persistence Measures

Both objective and subjective measures of persistence are employed in the estimation of persistence. Persistence is usually measured, objectively, by the time or total trials of a subject at an assigned task. The former measure is sometimes referred to as temporal persistence, while the latter measure is analogous to resistence to extinction. MacArthur (1955) briefly describes many of the objective tests commonly used in persistence studies.

Subjective measures of persistence, which include peer and teacher ratings, may be superior in assessing certain qualitative aspects of persistence, but are inferior with respect to the halo effect. MacArthur (1955) found a factor which was interpreted as a bipolar factor contrasting reputation for persistence with objectively measured persistence. Contemporary studies tend to rely upon objective measures of persistence.

The Problem

There is sufficient evidence to point to the importance of the relationship between persistence and academic achievement. The available evidence also

suggests that persistence is dependent upon the interaction of personal and situational factors. In general, the research on persistence has tended to stress the situational variables which contribute to persistence. Both personality and situational variables are important if research is to be able to indicate the conditions under which Marvin's persistence is likely to be increased the most. The studies that have investigated the relationship between persistence and personality have tended not to differentiate between ideational and physical persistence or to use mainly physical persistence tasks. However, in addition to a general factor of persistence, MacArthur (1955) in his factorial analysis of 21 persistence tests found group factors dealing with physical and ideational tests. Ideational persistence would appear to be particularly relevant to most school related tasks. It is the purpose of this study to consider a number of personality factors which might be expected, on the basis of experimental evidence, or on theoretical grounds, to relate to ideational persistence. The personality factors, thus selected, are extraversion - introversion, neuroticism, impulsivity - reflectivity, authoritarianism and attitude toward school.

CHAPTER II

REVIEW OF THE RELATED LITERATURE

IDEATIONAL PERSISTENCE AND SELECTED PERSONALITY VARIABLES

Extraversion - Introversion and Ideational Persistence

Both Jung (1923), who introduced the concept of extraversion - introversion, and Eysenck (1960), who is responsible for much of the current scientific interest in the construct, maintain that this personality variable is unrelated to psychological adjustment - maladjustment. This perspective is at variance with that of Freud (1920), who identifies introversion with incipient neuroticism, and Murphy (1947), who considers introversion to be a matter of low self-esteem. Most investigators use Freud's concept of introversion (Eysenck, 1970). Extraverts are commonly assumed to be more sociable than introverts, although there is some disagreement on this point also. Eysenck (1970) argues that a close study of Jung's writings reveals that sociability is not one of the outstanding marks of the extravert and that the view that there is a close connection between the two appears to emmanate from Freyd (1924). Nevertheless, sociability is used as the main criterion of extraversion by many investigators. Cattell (1956), for example, defines extraversion - introversion as a second order factor, objectively determined through factor analysis, comprising

five basic factors of personality. More specifically, extraversion is characterized by the qualities of sociability, aggressiveness, enthusiasm, adventure and group-dependency, and introversion is identified with aloofness, mildness, glumness, shyness and self sufficiency. For the purpose of the present study, Cattell's concept of extraversion - introversion was adopted, since Cattell's instrument is used herein.

A survey of the research of the past 20 years indicates that a number of studies have been directly, or indirectly, concerned with ideational persistence and the extraversion - introversion dimension of personality. Foulds (1956) found that introverts were more persistent than extraverts on the Raven's Progressive Matrices. Eysenck (1959) also presented data showing that extraverts gave up significantly more quickly than introverts toward the end of the Morrisby Compound Series Test. Contrary to prediction, the extraversion - introversion variable did not have an affect on ideational persistence in a study conducted by Brachman and Costello (1963). However, Battle (1965) found that "inner directed" students were more persistent than "other directed" pupils.

Eysenck's (1957) theory of personality is predictive of differences in ideational persistence between extraverts and introverts. According to Eysenck, extraverts are individuals in whom reactive inhibition develops quickly

and strongly, and dissipates slowly. Introverts are considered to be individuals in whom reactive inhibition accumulates slowly and weakly, and dissipates rapidly. On this basis, introverts would be expected to demonstrate greater ideational persistence than extraverts.

If, as has been suggested, extraversion - introversion is indicated by the degree to which an individual is oriented toward others, then there appears to be a good reason to identify the extravert with, for example, Roe's (1957) "people-oriented" individual and the introvert with her "thing-oriented" person. On the basis of such an alignment, it could be predicted from the Roe theory that extraverts would demonstrate less long-term persistence than introverts at a thing-oriented occupation. Allowing a positive relationship between short and long-term persistence, and assuming some similarity between a task of ideational persistence and a thing-oriented occupation, extraverts would be expected to be less persistent than introverts on a task of ideational persistence, especially under conditions of individual testing.

Neuroticism and Ideational Persistence

Neuroticism is also a concept regarding which there is some disagreement among concerned scholars. Firstly, there exist differences of opinion with respect to the relationship between neuroticism and psychoticism. Eysenck (1957) has presented evidence in support of the

hypothesis that neurotic and psychotic behaviors are essentially different. Freudian theory, on the other hand, demands a single continuum from normal, through neurotic, to psychotic. Agreement is also lacking regarding the relationship between anxiety and neuroticism. In Freud's view, anxiety plays the central role in neuroticism (Scheier and Cattell, 1961), while Eysenck (1957) maintains that the traditional psychiatric syndromes in the field of neuroses are generated by the factors of neuroticism, or emotionality, and extraversion - introversion. According to Eysenck (1957) then, anxiety is a combination of neuroticism and introversion, and hysteria is a combination of neuroticism and extraversion. Scheier and Cattell (1961), on the other hand, attribute half the difference between neurotics and normals to differences in anxiety levels, and account for the most marked differences between clinically-judged neurotics and normals in terms of six personality factors, whereby the neurotic is characterized by sensitivity, depressiveness, submissiveness, lack of self-confidence, tension and emotional instability. Scheier and Cattell's definition of neuroticism is basic to the present study as their instrument, the IPAT Neuroticism Scale Questionnaire, is used to gauge neuroticism.

Although the relationship between neuroticism and performance has been the subject of extensive research, few studies appear to have investigated the relationship

between neuroticism and ideational persistence. Brachman and Costello (1963), however, reported data in support of their hypothesis that normal subjects would be more persistent than neurotics on an unsolvable Magic Number Square, and Atkinson and Litwin (1960) found that subjects with high test anxiety left a final examination earlier than subjects with low test anxiety. On the other hand, Smith (1964) found test anxiety to be positively related to time spent in examinations. However, Ollendick (1971) reported that test anxiety was negatively related to persistence. Of course, examinations are usually timed, whereas in tests of ideational persistence unrestricted time is the rule. In this sense, the situations are different, and the last three studies cited should not be considered as having so direct a bearing on the relationship between neuroticism and ideational persistence as that conducted by Brachman and Costello.

Brachman and Costello (1963) invoke the Yerkes-Dodson law to predict a negative relation between neuroticism and ideational persistence. The Yerkes-Dodson law indicates that performance on tasks improves with increase of drive up to an optimum that is usually characteristic of the task and its difficulty and, beyond the peak, drive becomes maladaptive. Brachman and Costello argue that the high drive of neurotics would be expected to interfere with performance on a complex ideational task of persistence. Smith (1964), on the other hand, cites a number of studies

indicating that, under ego-involving conditions, students with high test anxiety perform more slowly than subjects with low anxiety. On the basis of this finding, Smith suggests that there should be a positive relationship between anxiety and persistence. Feather (1961) is among a number of investigators who view the relationship between anxiety and persistence as variable and dependent upon a number of factors, including achievement motivation. In general, however, it would appear that the neurotic individual, under conditions of stress, would be likely to be at a disadvantage in so far as ideational persistence is concerned.

Impulsivity - Reflectivity and Ideational Persistence

Thurstone (1953) identifies "impulsive" as one of seven traits, or continua of temperament, whereby the highly impulsive individual is described as "happy-go-lucky," liking to take chances and able to make decisions quickly. Kagan (1965) has also investigated impulsivity - reflectivity, but as a decision-time variable, and has identified children with two different conceptual tempos. According to Kagan, the impulsive child tends to display a fast reaction time, and the reflective child a slow reaction time, in situations involving response uncertainty. Kagan suggests that the tendency toward reflection or impulsivity is linked to some basic aspects of the child's personality, and argues that the reflective child is a

low-risk child who avoids situations that are potentially dangerous and productive of failure, humiliation, or harm, while the impulsive child is conceived as being a child who prefers a high-risk orientation. In common with Thurstone, Gordon (1963) identifies impulsivity - reflectivity as a personality trait, which he terms "cautiousness." Gordon describes, as highly cautious, persons who consider matters very carefully before making decisions and do not like to take chances, or run risks. According to Gordon, those who are impulsive act on the spur of the moment, make hurried or snap decisions, enjoy taking chances and seek excitement. Since Gordon's definition of cautiousness was considered to be synonymous with the concept of impulsivity - reflectivity as conceived for the purpose of this study, the Gordon Personal Inventory, C Scale was used as a measure of the impulsivity - reflectivity personality variable.

The relationship between the impulsivity - reflectivity variable and ideational persistence appears to have received limited coverage in the psychological and educational research. However, Kagan (1965) showed that impulsive boys spent less time with a difficult task than reflective boys. Kagan (1965) suggests that the impulsive individual places a greater value on quick success than he does on avoiding failure, whereas the reflective individual places a greater value on avoiding failure. In the case of a difficult ideational task, the chances

of success are remote and the impulsive individual would be expected to demonstrate less persistence than the reflective person.

Authoritarianism and Ideational Persistence

The concept of authoritarianism used for the present study was that developed by Adorno, Frenkel-Brunswick, Levinson and Sanford (1950) during their investigation of social discrimination. At that time, the study of social attitudes as a function of personality variables was rare. Fromm (1941) and Maslow (1943) were also pioneers in this respect (Christie and Jahoda, 1954).

Adorno et al (1950) postulated nine components of authoritarianism which one may interpret variously to be related to persistence:

a. Conventionalism. Rigid adherence to conventional, middle-class values
b. Authoritarian submission. Submissive, uncritical attitude toward idealized moral authorities of the ingroup.
c. Authoritarian aggression. Tendency to be on the lookout for, and to condemn, reject, and punish people who violate conventional values.
d. Anti-intraception. Opposition to the subjective, the imaginative, the tenderminded.
e. Superstition and stereotypy. The belief in mystical determinants of the individual's fate; the disposition to think in rigid categories.
f. Power and "toughness." Preoccupation with the dominance-submission, strong-weak, leader-follower dimension; identification with power figures; overemphasis upon the conventionalized attributes of the ego; exaggerated assertion of strength and toughness.
g. Destructiveness and cynicism. Generalized hostility, vilification of the human.
h. Projectivity. The disposition to believe that wild and dangerous things go on in the world; the projection outwards of unconscious emotional impulses.

i. Sex. Exaggerated concern with sexual "goings-on." (p. 228).

Moreover, Frenkel-Brunswick (1949) has suggested that the prejudiced person also has a rigid personality. As well, Titus and Hollander (1957) review a number of studies relating authoritarianism with rigidity. It could be argued that rigidity is related intimately to persistence. In fact, in a recent study, Diciaula (1970) found persistence to be significantly correlated with rigidity ($p<.02$).

On the basis of the above mentioned study, and in consideration of the conventionalism and authoritarian submission associated with the authoritarian personality, it would appear that the authoritarian individual could reasonably be expected to demonstrate greater persistence, at a difficult ideational task, than the non-authoritarian person.

Attitude Toward School and Ideational Persistence

It appears that the relationship between ideational persistence and attitude toward school has not been the subject of investigation in the educational and psychological research, although attitude toward school and persistence in school, or the "holding power" of the school, has been investigated in a number of studies. There seems to be a considerable measure of agreement between investigators, comparing drop-outs with those who persist in school, regarding the importance of attitude toward school as

a variable differentiating between the two groups. For example, Speer (1964) matched dropouts and graduates on socioeconomic status, occupation of parents, age and measures of aptitude, and found significant attitudinal differences toward school between the groups. In another such study conducted by Martin (1964), 51% of the dropouts expressed lack of interest in school, and 39% felt that they were not getting anything worthwhile out of school. Zeller (1966) cites antagonism toward teachers and/or the principal and lack of interest in school as factors related to dropping out. Penner (1970) also reports that not getting anything worthwhile out of school, and not liking teachers, were among the most frequent reasons given for dropping our of school.

If persisting in school bears any relation to ideational task persistence, then attitude toward school might reasonably be expected to be related to ideational task persistence. Furthermore, assuming that both an accepting attitude toward school and high ideational task persistence are more characteristic of conforming individuals than non-conforming persons, then individuals with a more positive attitude toward school might be expected to demonstrate greater ideational persistence than students with a less positive attitude toward school.

HYPOTHESES

In view of the preceding considerations of persistence

and selected personality dimensions, certain hypotheses may be offered. It could be contended that:

1. High persisters will be more introverted than low persisters.
2. Individuals high in persistence will be less neurotic than persons low in persistence.
3. High persisters will be more reflective than low persisters.
4. Persons high in persistence will demonstrate greater authoritarianism than low persisters.
5. High persisters will have a more positive attitude toward school than individuals low in persistence.

CHAPTER III

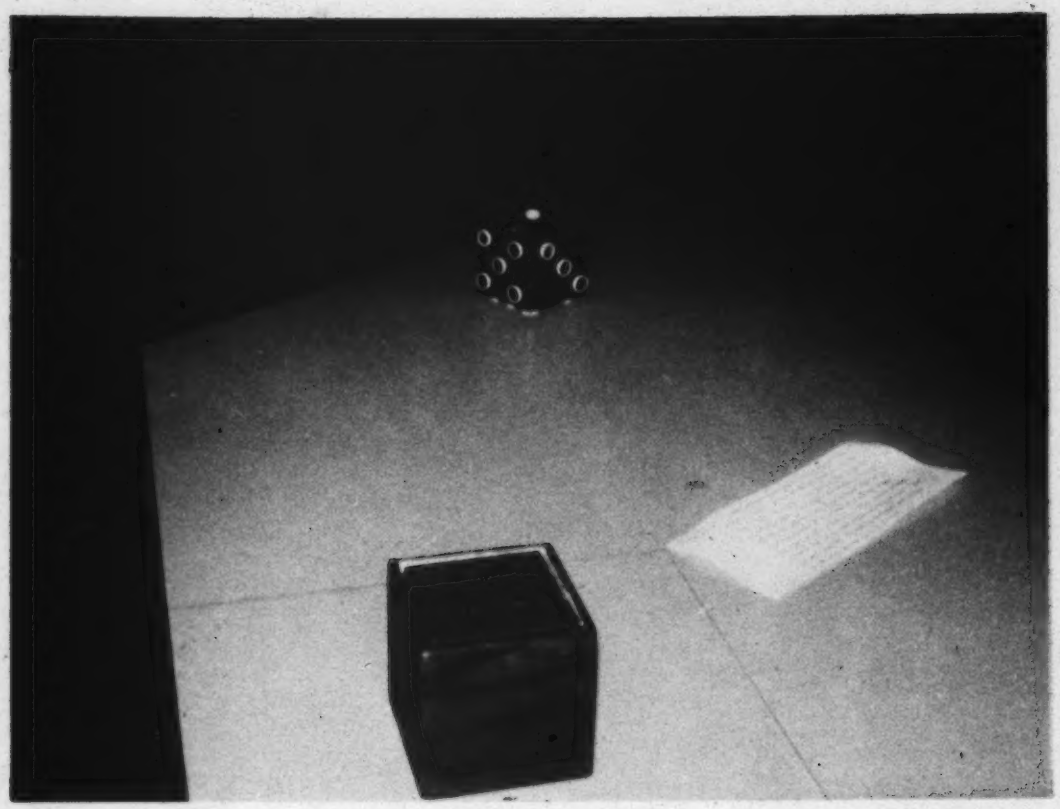
DESIGN AND PROCEDURE

Sample

Subjects for this study were drawn from the 78 grade nine students attending a junior high school in a small town located 12 miles from a city of approximately 440,000 residents in northern Alberta. The grade nine student body comprised 40 girls and 38 boys. The data was collected, during the last week of the school year 1972-1973, from 20 boys, randomly selected from the grade nine boys, and 20 girls, randomly selected from the grade nine girls.

Procedure

Prior to the individual testing of ideational persistence, all the grade nine students were administered the battery of personality tests, which were represented as an opinion survey, in one of three group sittings. The 40 subjects were then tested individually for ideational persistence, in a room designated for the purpose, in a boy-girl sequence. Each subject, upon entering the testing room, was shown the completed Nintendo Challenge Dice and the assembled adaptation of Parkers' Soma as shown in Plate I. They were then instructed as follows: "These puzzles test a person's problem solving skill. This is the dice. As you can see the spots are removable pegs of different lengths.



The Completed Nintendo Challenge Dice and
the Assembled Adaptation of Parkers' Soma

PLATE I

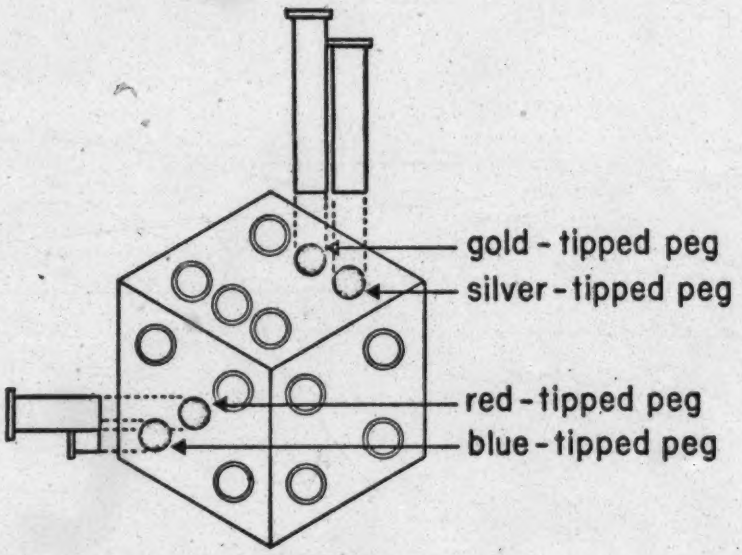
(At this point, the examiner removed all the pegs). The object of this puzzle is to insert the pegs in the holes. The puzzle is completed when all the pegs have been fully inserted. This is the cube. As you can see it is made up of several pieces. (Here the examiner removed all the pieces from the box). The object of this puzzle is to fit the pieces completely into the box. I want you to work on the dice first. When you have completed the dice, or no longer want to work on the dice, you may go

on to the cube." Subjects were permitted to work on the cube until it was completed, or until they indicated that they wished to discontinue the task. Actual persistence times (in minutes) were recorded.

INSTRUMENTS

The Ideational Persistence Test

The ideational persistence test involved the use of the Nintendo Challenge Dice, presented as a test of problem-solving skill, as depicted in Figure I.

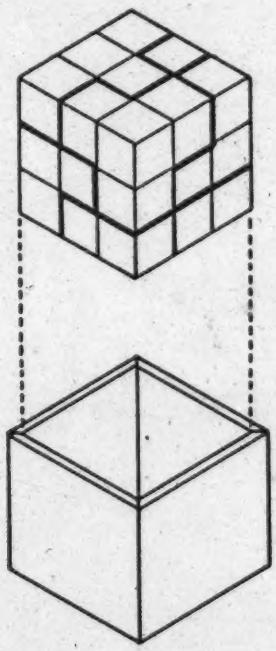


Nintendo Challenge Dice

FIGURE I

This instrument is a hollow, red, plastic, 2.75" cube, perforated with holes 0.375" in diameter in the formation

of spots on a dice. Twenty-one white, plastic pegs, of varying lengths, must be completely inserted into the holes to effect a solution. The pegs comprise 2 gold-tipped pegs 2.25" long, 7 silver-tipped pegs 1.875" long, 4 red-tipped pegs 1.125" long and 8 blue-tipped pegs 0.375" long. Subjects' ideational persistence was the length of time, in minutes, spent on the Nintendo Challenge Dice, given the opportunity to shift to an adaptation of Parkers' Soma, as shown in Figure II.



Adaptation of Parkers' Soma

FIGURE II

Parkers' Soma is a red, plastic 3" cube, comprising 7 interlocking pieces, which had to be fitted piece by piece

into an open, wooden, red box for this occasion. High persisters were considered to be the most persistent 50%, and low persisters the least persistent 50% of the 40 subjects.

IPAT Contact Personality Factor

The IPAT Contact Personality Factor (CPF) scale was used in the present study as a measure of extraversion - introversion. This instrument is a self-administering, brief assessment inventory of 40 items, which yields an extraversion - introversion and a distortion score. According to the author, the function of the scale is to indicate the amount of contact tendencies which an applicant, employee or student has (Cattell, 1956). The high scoring (extraverted) individual is characterized as sociable, aggressive, enthusiastic, adventurous and group-dependent. To the low scorer (introvert) is attributed the qualities of aloofness, mildness, glumness, shyness and self-sufficiency. Five of the 16 basic factors of personality, isolated in research studies by Cattell, are included in the contact personality factor, or second order factor of extraversion - introversion.

Item selection for the CPF was based on the loadings on the particular primary factor each item represented. The factor loadings of items in Form A, which was used in the present study, range from .13 to .57 (Cattell, 1956, p. 13). A reliability estimate is given for a sample of

125 otherwise undescribed cases, for whom the correlation between Forms A and B was .86 (Cattell, 1956, p. 15).

IPAT Neuroticism Scale Questionnaire

The IPAT Neuroticism Scale Questionnaire (NSQ), which is a 40-item inventory designed to measure degree of neuroticism or neurotic trend, was used in the present study as an indicator of neuroticism. Six of the 16 basic factors of personality identified by Cattell are considered to differentiate between normal persons and those clinically diagnosed as neurotic, and are included for measurement in the NSQ. The first three factors relate to sensitivity, depressiveness and submissiveness, and the final three factors, which are combined to form an anxiety component, comprise lack of self-confidence, tension and emotional instability (Scheier and Cattell, 1961).

The construct validities for each of the four NSQ components are reported as .74, .76, .69 and .84, respectively (Scheier and Cattell, 1961, p. 11). With respect to concurrent validity, Scheier and Cattell (1961, p. 12) indicate that the total score of 102 clinically judged neurotics was found to be significantly higher than the scores of 1,068 normals (Scheier and Cattell, 1961, p. 12). Corrected split-half reliabilities, based on 300 normal subjects, are reported as .55, .57, .47 and .70, respectively, for the four component scales and .67 for the total score (Scheier and Cattell, 1961, p. 11).

Gordon Personal Inventory, C Scale

The C Scale of the Gordon Personal Inventory (GPI), which is designed to measure "cautiousness," was used in the present study as a test of impulsivity - reflectivity. "Cautiousness" is one of the four traits, based on factor studies, measured by the GPI. High scorers on the C Scale are represented as individuals who consider matters very carefully before making decisions and do not like to take chances, whereas, low scorers are described as persons who act on the spur of the moment, make hurried or snap decisions, enjoy taking chances and seek excitement (Gordon, 1963, p. 3). Cautiousness is represented by one of the phrases in each of 20 sets of four descriptive phrases called "tetrads." For each tetrad, the respondent is required to mark one descriptive phrase as being most like himself and one phrase as being least like himself.

Gordon (1963, p. 11) provides correlations of only certain typical items with the factor they help to measure, with the range being .48 to .81. Evidence is presented showing that the scales of the GPI do allow for group discrimination on certain industrial and training performance criteria (Gordon, 1963, p. 12). Data is provided indicating only small changes in scores under differing motivational conditions (Gordon, 1963, p. 16). Split-half reliability for the C Scale, based on samples of 168 college students, 103 high school seniors and 124 college students, is reported as .83 (Gordon, 1963, p. 17).

The F-Scale

The California F-Scale was designed as a measure of the predisposition to Fascism (Adorno, Frenkel-Brunswick, Levinson and Sanford, 1950). In subsequent research, however, the F-Scale has been used most extensively as a measure of authoritarianism (Titus and Hollander, 1957). It is suggested by Titus and Hollander (1957) and Deutch and Krauss (1965) that the F-Scale is the most widely validated measure of authoritarianism available.

In the present study, the 29-item form of the F-Scale was used as a measure of authoritarianism. Respondents indicate their degree of disagreement (-3, -2, -1) or agreement (+1, +2, +3) to each item. In order to produce only positive scores, a constant of 116 is added to the summed weights. Test-retest reliability estimates reported by Adorno et al (1950, p. 258) range from .85 to .91.

The Attitude Toward Any Institution Scale (Remmers Short Form)

Remmers (1960) developed his 17-item scale on the basis of the 45-item, Thurstone-type scale constructed by Kelly in 1934. Remmers' shorter version, which was used in the present study, is a more generalized scale which is intended to be applicable to "any social or other institution" (Shaw and Wright, 1967, p. 552). The institution selected, for the purpose of the present study, was the "school system."

Respondents are required to make a plus (+) beside the items with which they are in agreement. Each item, for which agreement is indicated, receives the appropriate scale value for that item. Scoring is achieved by selecting the mid-point of the interval in which the median scale value occurs. High scores indicate positive or uncritical attitudes toward the particular institution. Acceptable concurrent validity is suggested by studies employing Remmers' version of the scale (Shaw and Wright, 1967, p. 553). The scale correlated .78, for example, with a specific attitude scale on Sunday observance ($N = 222$). Equivalent-form reliabilities of .89, .77, .98, .71 and .81 have been reported by Kelly applying the scale to the institutions of communism, war, Sunday observance, marriage and divorce, respectively (Shaw and Wright, 1967, p. 552). An equivalent-forms reliability estimate obtained by Fox (1969) was .78 ($N = 32$).

CHAPTER IV

FINDINGS AND CONCLUSIONS

Firstly, the sample was ordered in terms of ideational persistence scores and the highest 50% of scorers and the lowest 50% of scorers were selected for comparison with respect to the personality variables under consideration. Then the significance of the difference between the means for the high and low persisters on each of the personality measures was calculated for the purpose of deriving support for the previously stated hypotheses. A restatement of these hypotheses follows, accompanied by the presentation of the results and conclusions.

HYPOTHESIS 1

High persisters will be more introverted than low persisters.

Findings

The 20 high persisters and the 20 low persisters were administered the IPAT Contact Personality Factor scale in order to seek confirmation of the existence of a positive relationship between ideational persistence and introversion. From the summary of results appearing in Table I, it can be noted that, contrary to prediction, the mean for the high persisters was slightly higher than the mean for the low persisters. However, the obtained

TABLE I

SUMMARY OF DIFFERENCES BETWEEN HIGH AND LOW PERSISTERS ON FIVE PERSONALITY INDICES

PERSONALITY INSTRUMENT	HIGH PERSISTERS Mean	S D	N	LOW PERSISTERS Mean	S D	N	df	t	P
IPAT CPF	38.10	6.03	20	37.75	6.06	20	38	0.18	N.S.
IPAT NSQ	37.25	3.40	20	40.25	4.78	20	38	-2.29	0.02
GPI C SCALE	20.20	2.76	20	20.75	3.19	20	38	-0.58	N.S.
F-SCALE	123.55	19.87	20	120.05	26.24	20	38	0.48	N.S.
REMMERS' ATI	7.63	1.56	20	8.25	0.69	20	38	-1.62	N.S.

t value of .18 does not represent a significant difference between the means at the .05 level. On the basis of these results, Hypothesis 1 was not supported.

HYPOTHESIS 2

Individuals high in persistence will be less neurotic than persons low in persistence.

Findings

In order to test this hypothesis, the data resulting from the administration of the IPAT Neuroticism Scale Questionnaire to the two groups were analysed. The summary of results presented in Table I supports the existence of a positive relationship between ideational persistence and lack of neuroticism. It can be observed that a t value of 2.29 was obtained. Since this value represents a significant difference between means at the .02 level, Hypothesis 2 was confirmed.

HYPOTHESIS 3

High persisters will be more reflective than low persisters.

Findings

For the purpose of investigating the relationship between ideational persistence and the impulsivity - reflectivity dimension of personality, the Gordon Personal Inventory, C Scale, was administered to the high and low persisters. Contrary to prediction, the

summary of results in Table I indicates that the mean for the high persisters was slightly lower than that for the low persisters, although the t value of .58 does not represent a significant difference between means at the .05 level. Consequently, Hypothesis 3 was rejected.

HYPOTHESIS 4

Persons high in persistence will demonstrate greater authoritarianism than low persisters.

Findings

The California F-Scale completed by the two groups provided the data to test this hypothesis. The summary of results given in Table I shows that the mean for the high persisters was, according to prediction, higher than that obtained for the low persisters. However, the t value of .48 does not represent a significant difference between means at the .05 level, and, on this basis, Hypothesis 4 was rejected.

HYPOTHESIS 5

High persisters will have a more positive attitude toward school than individuals low in persistence.

Findings

The Attitude Toward Any Institution Scale (Remmers Short Form) was administered to the high and low persisters

In order to test the prediction of the existence of a positive relationship between ideational persistence and a favorable attitude toward school. As the summary of results in Table I indicates, and contrary to prediction, the mean for the low persisters was slightly higher than that for the high persisters. The obtained t value of 1.62, however, does not represent a significant difference between means at the .05 level. On the basis of these results, Hypothesis 5 was rejected.

Conclusions

The above findings suggest the following conclusions:

1. High persisters are not different from low persisters with respect to the extraversion - introversion dimension of personality as measured by the IPAT Contact Personality Factor scale.
2. High persisters are less neurotic than low persisters as indicated by the IPAT Neuroticism Scale Questionnaire.
3. High persisters are not different from low persisters in terms of impulsivity - reflectivity according to the Gordon Personal Inventory, C Scale.
4. High persisters and low persisters are not different with respect to authoritarianism as measured by the California F-Scale.
5. High persisters and low persisters are not different

in terms of attitude toward school as indicated by the Attitude Toward Any Institution Scale.

CHAPTER V

DISCUSSION AND IMPLICATIONS

DISCUSSION

The results of the present study support the hypothesis of the existence of a positive relationship between ideational persistence and lack of neuroticism. However, the remaining hypotheses regarding positive relationships between ideational persistence, on the one hand, and introversion, reflectivity, authoritarianism and a positive attitude toward school, on the other hand, were not confirmed by the findings of the current study.

Ideational Persistence and Neuroticism

The finding of a positive relationship between ideational persistence and lack of neuroticism is in keeping with the results of the previously mentioned studies conducted by Atkinson and Litwin (1960), Brachman and Costello (1963) and Ollendick (1971). This result is not incompatible with the idea expressed by Brachman and Costello (1963) that the high drive or anxiety associated with neuroticism interferes with performance on a difficult task of ideational persistence. However, it should be noted that the anxiety component of the IPAT Neuroticism Scale Questionnaire (NSQ) did not alone differentiate between the high and low persisters in the current study. Since the high and

low persisters did not differ significantly with respect to any single component of the NSQ, it appears that it was the combination of sensitivity, depressiveness, submissiveness and anxiety which had an effect on ideational persistence.

Ideational Persistence and Introversion

The lack of a positive relationship between persistence on the Nintendo Challenge Dice, under conditions of individual testing, and performance on the IPAT Contact Personality Factor scale is contrary to the findings of Foulds (1956) and Eysenck (1959), who both used intelligence tests as ideational persistence tasks. However, Brachman and Costello (1963), who employed the Magic Square Test of ideational persistence, also failed to find a relationship between ideational persistence and the extraversion - introversion dimension of personality. The results of the present study, in common with those of Brachman and Costello (1963), may be a function of the interest of the task utilized, since there did appear to be high interest in and willingness to attend to work with the puzzle among the subjects. In this regard, it could be significant that the current study was conducted during the last week of the school year, when the task may have represented an interesting diversion from the alternative classroom activities. Willett and Eysenck (1962) believe that level of

motivation is a crucial variable in extraversion - introversion comparisons and have presented evidence in support of the hypothesis that a high level of motivation tends to neutralize the high degree of reactive inhibition which they associate with extraversion.

In addition, although experimenter-subject social interaction was standardized and minimal, the results of this study could have been affected by this variable, which has been found by Berkowitz, Butterfield and Zigler (1965) to relate to persistence. For example, the fact that the general attitude toward the examiner and the project, on the part of the classes involved, appeared to be positive, may have encouraged persistence in the extraverts. According to Costello and Eysenck (1961) extraverts are more dependent than introverts on the judgements and values of the immediate group. It is also possible that the introverted subject was distracted by the presence of the examiner in the individual testing situation, although such a condition was not apparent to the examiner.

Ideational Persistence and Reflectivity

It appears that the failure of the current study to find a positive relationship between ideational persistence and reflectivity could have been due to the nature of the ideational persistence task. Firstly, the task may have prevented the impulsive subject, to some

extent, from operating in an impulsive manner, since there seemed to be little possibility of a subject arriving at a hasty and incorrect solution of the Nintendo Challenge Dice without the error being evident. This line of reasoning is not inconsistent with Kagan's (1965) suggestion that the impulsive individual places a greater value on quick success than he does on avoiding failure. In relation to the task employed in the present study, however, the subject could not rapidly complete the task by resorting to an incorrect response.

In addition, the non-threatening presentation of the ideational persistence task may have tended to discourage persistence, to some extent, in the case of the reflective subject. According to Kagan (1965), the reflective child is a low-risk individual who avoids situations that are productive of humiliation or harm, and places a greater value on avoiding failure than on quick success. Although the task used in the current study was represented as a test of problem solving skill, the subjects worked individually and understood that their results were anonymous. Under these conditions, it appears likely that the reflecting individual would not view failure to complete the task as productive of humiliation or harm, or as a case of personal failure, and would, therefore, not be highly motivated, on the basis of reflectivity, to solve the problem.

Ideational Persistence and Authoritarianism

The absence of a relationship between persistence on the Nintendo Challenge Dice and the measure of authoritarianism used in this study also requires examination. Firstly, on the basis of the assumption that authoritarianism and rigidity are closely related, the findings of the present study appear to be contrary to the results obtained by Diciaula (1970), who reported a significant and positive relationship between persistence and rigidity. In this regard, the results of the current study may be a function of the ideational persistence task situation, which did not seem to be productive of anxiety. This possibility is suggested in view of Brown's (1953) study of the relationship between rigidity and authoritarianism, which indicated that the rigidity associated with authoritarianism is a kind of defense mechanism which is perceived as warding off personal failure. According to Brown (1953), it may be necessary to arouse some anxiety over achievement before authoritarian subjects will demonstrate rigidity.

Secondly, the postulation of a positive relationship between ideational persistence and authoritarianism was also based on the assumption that the high conventionalism and authoritarian submission, characteristic of the authoritarian individual, would be productive of superior persistence on the part of authoritarian subjects.

However, it is possible that persistence on the Nintendo Challenge Dice did not represent a strong conventional middle class value and that the examiner did not represent a power figure.

Ideational Persistence and Attitude Toward School

Underlying the hypothesis of a positive relationship between ideational persistence and a positive attitude toward school were a number of explicit, but questionable, assumptions, which, in the absence of the anticipated results, require reconsideration. It was argued, for example, that if ideational task persistence is related to persisting in school, then ideational task persistence, in common with persisting in school, should be positively related to an uncritical attitude toward school. While the assumption of similarity between ideational task persistence and persisting in school may be in error, generally, it is possible that ideational task persistence does bear a relation to persisting in school, and that ideational task persistence is positively related to an accepting attitude toward school, when the measure of ideational task persistence used strongly resembles the school situation. It is interesting to note, for example, that the relationship between persistence and school success varies roughly in proportion to the degree to which the persistence measures employed resemble the school situation (MacArthur, 1955). Many measures of

ideational task persistence, such as arithmetic problems, appear to be school related tasks and are presented in the form of classroom tests. Although the Nintendo Challenge Dice used in the present study was presented in the school setting, this task and the manner of its presentation did not appear to strongly resemble the school situation. On this basis, it is possible that the ideational persistence task tended to increase, to some extent, the ideational persistence of those subjects with a negative attitude toward school. At the same time, those subjects with a positive attitude toward school may not have been so highly motivated to complete the ideational persistence task as they would have been to master a task which was more obviously school related. This possibility is not inconsistent with the assumption that was made regarding the greater conformity of students with a positive attitude toward school.

IMPLICATIONS

In view of the relationship between ideational persistence and success in school, the finding of a positive relationship between ideational persistence and lack of neuroticism would appear to have important educational implications. However, the precise nature of the relationship between ideational persistence and neuroticism is not apparent. Although Brachman and Costello (1963) have suggested that neuroticism interferes with

ideational persistence, there seems to be no direct evidence that a reduction in neuroticism increases ideational persistence. Determining the effect of neuroticism-reducing techniques on ideational persistence would appear to be an undertaking for further research.

In the absence of a clear understanding regarding the nature of the relationship between ideational persistence and neuroticism, it is somewhat difficult to relate the findings of the present study to the classroom situation. There also appears to be a lack of information regarding the manner in which the low persister is treated in the classroom, although pressure to persist at school assignments and the threat of having to stay in after school seem to be fairly common responses to the low persister. However, regardless of the nature of the relationship between ideational persistence and neuroticism, and regardless of the effectiveness of pressure and threat with respect to increasing persistence, such treatment would appear most unsuitable for the low persister, who already tends to be more neurotic than his high persisting peers. On the other hand, the reinforcement of persistence has been found to be generally helpful in raising persistence, and, at the same time, does not seem to be productive of neuroticism.

BIBLIOGRAPHY

Adorno, T. W., Frenkel-Brunswick, E., Levinson, D. J., & Sanford, R. N. The authoritarian personality. New York: Harper, 1950.

Atkinson, J. W. Motivational determinants of risk-taking behavior. Psychological Review, 1957, 64, 359-372.

Atkinson, J. W. Personality dynamics. Annual Review of Psychology, 1960, 11, 255-290.

Atkinson, J. W., & Litwin, G. H. Achievement motive and test anxiety conceived as motive to approach success and motive to avoid failure. Journal of Abnormal and Social Psychology, 1960, 60, 52-63.

Battle, E. S. Motivational determinants of academic task persistence. Journal of Personality and Social Psychology, 1965, 2, 209-218.

Berkowitz, H., Butterfield, E., & Zigler, E. The effectiveness of social reinforcers on persisting and learning tasks following positive and negative social interactions. Journal of Personality and Social Psychology, 1965, 2, 706-714.

Brachman, H. M., & Costello, C. G. The relationship between persistence and personality. The Journal of Psychology, 1963, 55, 299-306.

Brown, R. W. A determinant of the relationship between rigidity and authoritarianism. Journal of Abnormal and Social Psychology, 1953, 48, 469-476.

Cattell, R. B. Manual for the IPAT Contact Personality Factor. Illinois: Institute for Personality and Ability Testing, 1956.

Christie, R., & Jahoda, M. Studies in the scope and method of the authoritarian personality. Glencoe, Illinois: Free Press, 1954.

Costello, C. G., & Eysenck, H. J. Persistence, personality and motivation. Perceptual and Motor Skills, 1961, 12, 169-170.

Deutsch, M., & Krauss, R. M. Theories in social psychology. New York: Basic Books, 1965.

Diciaula, P. J. Relationship of persistence to varying success and other relevant variables. Unpublished doctoral dissertation, Illinois Institute of Technology, 1970.

DiCola, J. M. Persistence of fifth graders of varying levels of self-esteem under various conditions of reinforcement. Unpublished doctoral dissertation, Nothern Illinois University, 1971.

Eysenck, H. J. The dynamics of anxiety and hysteria. London: Routledge and Kagan Paul, 1957.

Eysenck, H. J. Personality and problem solving. Psychological Reports, 1959, 5, 592.

Eysenck, H. J. (Ed.) Handbook of abnormal psychology. New York: Basic Books, 1960.

Eysenck, H. J. The structure of human personality. (3rd ed.) London: Methuen, 1970.

Feather, N. T. The relationship of persistence at a task to expectation of success and achievement related motives. Journal of Abnormal and Social Psychology, 1961, 63, 552-561.

Feather, N. T. The study of persistence. Psychological Bulletin, 1962, 59, 94-115.

Foulds, G. A. The ratio of general intellectual ability to vocabulary among psychoneurotics. International Journal of Social Psychiatry, 1956, 1, 5-12.

Fox, E. E. A life orientation scale: Correlates of biophilia and necrophilia. Unpublished doctoral dissertation, University of Alberta, 1969.

Frenkel-Brunswick, E. Intolerance of ambiguity as an emotional and perceptual variable. Journal of Personality, 1949, 18, 108-143.

Freud, S. General introduction to psychoanalysis. New York: Liveright, 1920.

Freyd, M. Introverts and extraverts. Psychological Review, 1924, 5, 74-87.

Fromm, E. Escape from freedom. New York: Farrar and Rhinehart, 1941.

Gordon, L. V. Gordon Personal Inventory. (Rev. ed.) New York: Harcourt and Brace, 1963.

Grotberg, E. H. An experimental investigation of persistence. Unpublished doctoral dissertation, Northwestern University, 1958.

Hartshorne, M., May, M. A., & Maller, J. B. Studies in the nature of character : II. Studies in service and self-control. New York: Macmillan, 1929.

Jenkins, W. O., & Stanley, J. C. Partial reinforcement : A review and critique. Psychological Bulletin, 1950, 47, 193-234.

Jung, C. G. Psychological types. New York: Harcourt and Brace, 1923.

Kagan, J. Impulsive and reflective children : Significance of conceptual tempo. In J. D. Krumboltz (Ed.), Learning and the educational process. Chicago: Rand McNally, 1965, 133-161.

Lewin, K. Behavior and development as a function of the total situation. In L. Carmichael, Manual of child psychology. New York: Wiley, 1946, 791-844.

Lewis, D. J. Partial reinforcement : A selective review of the literature since 1950. Psychological Bulletin, 1960, 57, 1-28.

MacArthur, R. S. An experimental investigation of persistence in secondary school boys. Canadian Journal of Psychology, 1955, 9, 42-54.

Martin, G. E. A survey of factors related to dropouts in grade IX in Newfoundland Central High Schools in 1961 - 62. Unpublished masters thesis, University of Alberta, 1964.

Maslow, A. H. The authoritarian character structure. Journal of Social Psychology, 1943, 18, 401-411.

Means, G. H., Means, R. S., Osborne, J. L., & Elsom, B. F. Task persistence as a function of verbal reinforcement and socio-economic status. California Journal of Educational Research, 1973, 24, 5-11.

Murphy, G. Personality : A biosocial approach. New York: Harper, 1947.

Ollendick, T. H. A study of need for achievement as related to persistence behavior and academic performance. Unpublished doctoral dissertation, Purdue University, 1971.

Penner, H. P. Factors, frequency, and consequences of students who dropped out of the Valleyview Junior and Senior High Schools. Unpublished masters thesis, University of Alberta, 1970.

Petersen, H. M. Multidimensional personality types and related behavior. Unpublished doctoral dissertation, Claremont Graduate School and University Center, 1968.

Remmers, H. H. Manual for the Purdue Master Attitude Scales. Lafayette, Indiana: Purdue Research Foundation, 1960.

Roe, A. Early determinants of vocational choice. Journal of Counseling Psychology, 1957, 4, 212-217.

Ryans, D. G. A study of the observed relationship between persistence test results, intelligence indices, and academic success. Journal of Educational Psychology, 1938, 29, 573-580.

Scheier, I. H., & Cattell, R. B. Handbook for the Neuroticism Scale Questionnaire. Illinois: Institute for Personality and Ability Testing, 1961.

Shaw, M. E., & Wright, J. M. Scales for the measurement of attitudes. New York: McGraw-Hill, 1967.

Smith, C. P. Relationships between achievement-related motives and intelligence, performance level, and persistence. Journal of Abnormal and Social Psychology, 1964, 68, 523-532.

Speer, S. C. A study of dropouts among vocational high school pupils with respect to attitude toward school. Unpublished doctoral dissertation, University of Connecticut, 1964.

Thurstone, L. L. Thurstone Temperament Schedule. (2nd ed.) Chicago: Science Research Associates, 1953.

Titus, H. E., & Hollander, E. P. The California F-Scale in psychological research: 1950-1955. Psychological Bulletin, 1957, 54, 47-64.

Willett, R. A., & Eysenck, H. J. Experimentally induced drive and difficulty level in serial rote learning. British Journal of Psychology, 1962, 53, 35-39.

Zeller, R. Lowering the odds on student dropouts. Englewood Cliffs, New Jersey: Prentice-Hall, 1966.